Travel Behavior Comparisons of Active Living and Inactive Living Lifestyles

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ABSTRACT

The past century's radical change, innovation in transportation technology and concomitant increase in options for our travel modes moves us away from walking to an almost total extinction of modes that require physical exercise. This is accompanied by a modern American city design that requires the use of an automobile with urban sprawl creating distant destinations that alter older methods of travel and make active forms of transportation almost impossible. However, many more reasons exist that motivate people to choose physically inactive modes as our research shows here. Using a two-day activity diary collected in Centre County Pennsylvania, we identify which factors influence active versus inactive mode choice. In this analysis, we examine the correlation between trip purpose and travel mode, the correlation between age and travel mode, and perform an analysis of travel distances to determine what the distance threshold is for active modes. In addition, a latent class cluster analysis establishes a profile for both physically active as well as inactive travelers and their correlation with person and household characteristics. Key findings include that trips made using active modes are significantly different than trips made by inactive modes and persons with active transportation lifestyles are significantly different than persons with inactive lifestyles. This raises the following issue: policies designed for and motivated by persons with active lifestyles risk to fail if they do not succeed in meeting the needs for everyday life of those with inactive lifestyles.

INTRODUCTION

For as long as humans have been on the earth, they have had within their capacity the ability to move and get where they need to go using a variety of methods including conveniences such as the horse, carriage, and wagon, which made transporting of additional things easier. Prior to 1990 the majority of individuals walked as their primary mode of transportation (1). The invention of the automobile in the early 20th Century changed the face of transportation in the United States and everywhere else. Initially, trips by automobile were used as forms of recreation on weekends to escape urban life. Early automobiles were primarily for the wealthy. Middle and lower income citizens remained primarily dependent on non-motorized forms of transportation. Since that time a new phenomenon has come to the forefront of American life. As time has progressed, especially since World War II, the automobile has evolved and progressed into the remarkable machine that it is today. Automobiles have become an essential tool in conducting people's daily life. Americans of all income and social levels, now have the opportunity to own an automobile. While the technology has made life easier, it has also caused many new problems.

Increased accessibility to auto ownership, and the development of the national highway system in the 1950s, have led to the development of suburbs and edge cities, allowing people to move further away from their place of employment (2). This increased distance requires more travel time to and from work, and less time for other activities such as recreation and physical activity. Today lack of physical activity is thought to be a primary factor in more than 200,000 deaths per year in the United States (3). With individuals relying so heavily on automobiles for transportation, very few are actually using their body for active forms of transportation such as walking and bicycling. Activity that used to be acquired simply by traveling on daily outings, is now considered exercise by most, and must be packed into the already busy schedule that most Americans follow. Current lifestyle patterns have engineered physical activity for non-exercise purposes out of many American's lives (4, 5, 6).

Integrating additional walking and biking into daily routines may be a better public health strategy than traditionally structured and organized programs (7, 8, 9, 10). The basic assumption is that changing trip-making behavior to include more non-motorized trips can translate into favorable public health consequences (8). To combat the problem of inactivity, the US Public Health Service has included a national objective for the year 2010 of more than a 50% increase in walking trips made by adults for trips less than one mile (6, 11). This poses a problem because it is not currently known how much Americans walk or bike in a day. There is no good baseline which makes it difficult to set a target for improvement.

Travel behavior research is important to determine how people will behave when given a choice regarding how and where to travel. This especially holds true with regards to active mode choice. Many factors have a proven affect on travel behavior and mode choice including: time allocation (6, 12); personal characteristics such as age (4, 13, 14), socio-economic status (15, 16, 17, 18, 19), gender (15, 19, 20, 21) and safety (22, 23, 24); lifestyles and attitudes (25, 26, 27, 28, 29, 30, 31); the natural and built environment (30, 32, 33, 34, 35, 36); and design of infrastructure (5, 7, 14, 15, 16, 30, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47). These topics will not be addressed in this study, as it is serving as a pilot study for future research involving active focused infrastructure and its impact on activity levels.

The main objective of this study is to determine baseline data and identify key traits or groups of traits exhibited by active travelers. More specifically, are individuals predisposed to choose active modes of transportation depending on specific demographic attributes? By

identifying these traits that distinguish active travelers from their inactive counterparts, this research seeks to gain a better understanding of which groups of people are most likely to choose specific modes of transportation. This identification will allow planners and policy makers to target specific groups when creating new transportation plans and infrastructure in such a way that increased active living can be achieved.

The next section provides an overview of the data used here. Then, the data analysis section provides a selection of the results obtained in the three-phase correlation component of the study and the pattern recognition exercise employing latent class cluster analysis. The paper ends with a summary and conclusion.

DATA USED

The primary source of data for this analysis comes from household questionnaires and activity diaries for each of the household members acquired through the CentreSIM project. The CentreSIM dataset is from a household and activity diary survey that covers all of Centre County, which had 135,940 residents in 2001. It also includes residents that work in Centre County and reside elsewhere. Each participating household provided voluntarily information about household composition and facilities available to the household members. In addition, each household member also reported personal information such as employment, driving ability, education and so forth. The survey also included a few questions about opinions and perceptions regarding the Centre County transportation system. Each person in the household provided a two-day complete record of the activities, which included the different transportation options selected. The sampling frame is a combination of several pools. These include a database of 46,448 household addresses in Centre County purchased from a commercial mailing list vendor in early October 2002, student address lists available through Penn State University (PSU), and a list of University Park Campus employees of PSU who reside outside of Centre County. From this pool, 8,925 households were randomly selected for recruitment in the mail back household questionnaire (including a variety of demographic and social/economic questions). Of the responding households, 2,537 agreed to participate in the activity diary component. After data cleaning and verification, 1,471 persons (from 718 households) were selected for the analysis in this paper. Table 1 shows the number of persons, households, and relevant social and demographic characteristics of the sample (48). A substantial amount of retired persons and school-age children are present in this sample. On one hand this is a positive fact because we can account and model the behavior of persons that are not included in other surveys. Additional information about CentreSIM can be found in Goulias and Kim (48).

Active Mode variables consist of questions relating to active modes of travel (walking or biking). These variables often tie into the other variable categories but are separated into an independent category due to the nature of this research work. The activity variables used for this research consist of information on individual activities (duration and type), travel mode and distance, and trip purpose (type of activity pursued at the destination and destination location). This information will establish a picture of actual travel behavior.

To gain an understanding of the group of individuals that we are analyzing for this study, it is important to have a general overview of their basic travel characteristics. Table 1 displays the general characteristics of the study sample. The mean travel time per day for individuals in the study was 53.08 minutes, which is almost one full hour. Both genders are equally represented and the mean age for the sample is about 42 years old. The majority of individuals are married with smaller households (72.1% have less than 3 people). Income levels for the

sample are equally dispersed. A large majority of the sample possesses a driver's license (85.40%), subscribe to cable television (82.00%) and have access to the internet (83.80%). Most households own 3 vehicles or less (89.70%).

(Insert Table 1 Here)

The analysis in the following section assesses the differences between not just active travelers and the population as a whole, but active travelers as they differ from inactive travelers within the population. Three major analysis steps help determine predictors for active travel. In the first step we examine correlations between mode choice and trip purpose. By determining if trips to certain destinations are more likely than others to be taken actively, predictors can be set for future trips to those locations. The second analysis step involves correlating age and travel mode. Using a multinomial method applied to the individual trip level, mode choice is regressed on multiple demographic variables to determine if age plays a significant role in the mode chosen for travel, while controlling for other sociodemographics. The third analysis step includes correlating travel distance with mode choice. This determines if active trips are limited to shorter distances as shown by previous research. After completing these three primary analyses at the level of individual trips, a latent cluster analysis is applied at the level of individuals. This determines if active travelers have multiple characteristics in common. By utilizing information on people's mode choice and their sociodemographics, people are grouped into different activity levels and demographic clusters. In this way we can show clearly which individuals are more likely to choose active modes of transportation. This data analysis offers greater insight as to the intricacies of mode choice and helps determine which types of people are more likely to travel utilizing active modes.

DATA ANALYSIS

Initially, the entire activity diary was reviewed and each household was assigned to one of four taxonomies of activity based on the levels of physical activity the household members demonstrated. The taxonomies are described with a percentage representing its concentration in the sample. Level one includes extremely active individuals who exercise almost daily and walk and bike frequently (1.2%). Level two includes active individuals who schedule exercise intermittently and walk and bike regularly (3%). Level three includes moderately active households who do not schedule exercise, but walk and bike occasionally (6.4%). Level four includes inactive households (individuals?) who are generally sedentary and rarely walk or bike (89.4%). These levels represent the baseline physical activity levels for all those participating in this research. This aids in assessing that there is indeed a substantial difference between those who are generally active and those who get no physical activity, and the majority of the people in the sample fall into the inactive category.

In order to begin the data analysis and compare active travelers with inactive travelers, the data set was separated into two distinct files. Each individual trip was filtered by mode into either the active travel file or the inactive travel file. Since each trip was analyzed independently, individual people may have trips listed in both the active and inactive file, however, any individual having at least one trip in the active travel file will be categorized as an active traveler for this research. Descriptive statistics of the active travel file and inactive travel file give a general picture of what these travelers look like. Results from this analysis can be seen in Table 2. Out of the general sample, only 6.65% of the individuals made any trips using

an active mode. Out of 13,120 total trips made by all participants in the sample, only 2,150 or 16.4% were made using an active mode.

(Insert Table 2 Here)

Inactive travelers spend about sixteen times more minutes traveling than active travelers each day. The mean age of active travelers is younger than the mean age of inactive travelers, and active travelers show a higher percentage of female travelers when compared to the percentage of females traveling inactively. The mean income of active travelers is slightly lower than that of the inactive travelers, and the household size of the active traveler is similar to the inactive traveler. Driver's license possession, subscription to cable television, and internet access is higher for active travelers than inactive. However, nearly half as many active travelers subscribe to satellite television when compared to inactive travelers. By simply comparing the active traveler demographics to the inactive travelers we begin to see noticeable differences in their tendencies in a number of factors indicating a more in depth analysis is required for understanding the heterogeneous nature of lifestyles.

After creating the active travel file, the file was separated into individual travel modes creating a separate file for bike trips and walking/jogging trips. The active travel files, as well as the subset mode files were aggregated in order to create a profile for each active traveler without replicating their data over multiple trips. This allowed a run of descriptive statistics on demographics without including multiple repetitions of data from the individual trips. It also verified that each individual was counted only once in each active file. Multiple statistical methods were used in the data analysis and will be discussed below.

Again, the purpose of this research is to gain a better understanding of which types of people are utilizing active modes, and what makes them different from those using inactive modes. The first step in assessing this difference is to determine if some trips are more likely than others to be made using active modes. To determine if this is the case, a cross-tabs analysis was conducted using trip purpose and travel mode as the comparative variables. Table 3 shows the percent of purposes for each mode with regards to specific destinations.

(Insert Table 3 Here)

The trips taken by active means serve specific purposes. Bicycles are primarily used as transportation to school (19.2%) and returning home again (17.3%) as well as for recreation (17.3%) as expected. Walking/Jogging primarily serves as transportation to work (15.2%), and for recreation (24.6%). When we look at the distribution of trips for each purpose we see a different result. Table 4 shows the top percentages of modes used for each purpose. It is immediately evident that all purposes primarily utilize automotive transportation. Secondarily they utilize walking/jogging as a mode of transportation but generally at only 30% of the automotive frequency for most purposes. Walking as a travel mode surpasses the automobile only for school related purposes and traveling to another mode. Pearson Chi-Square test indicates that there is a highly significant correlation between mode choice and trip purpose. This shows that the purpose of a trip will affect mode choice.

(Insert Table 4 Here)

A multinomial regression model for mode choice as a function of trip purpose and age was performed (other explanatory variables such as age, trip time, and trip length were included as well). The three mode choice categories are: inactive-private (car, truck, van, taxi, and motorcycle), active (walk/jog or bicycle), and inactive-public (bus and other modes). The inactive-public mode is used as the reference category for this regression. Table 5 provides the results of the mode choice model with respect to each trip purpose in which "to other mode" was used as reference trip purpose.

Trips taken to and from school are most likely to be taken using an active mode while work trips will most likely utilize inactive-private modes. This could be in part because students tend to live close to the school and do not always have access to a personal automobile. Shopping trips are highly likely to be taken using inactive-private modes as well as deliveries. This could be because these trips generally require the use of cargo space and may not be easily accomplished using active modes. When traveling to appointments of all kinds, individuals are most likely to choose inactive-private modes. Escort trips most likely utilize inactive-private modes because this is generally a parent or other adult accompanying a child to a location. Also trips undertaken to visit family and friends are likely to utilize inactive-private modes because family members and friends may not live close enough to utilize an active mode.

(Insert Table 5 Here)

A second analysis was performed to determine the effect of age on mode choice. Table 6 shows the basic descriptive statistics for active travelers and age. It immediately becomes clear that the most frequently appearing age for both active modes is 22 years old. This is quite a bit younger than the average age in the sample population.

(Insert Table 6 Here)

The same multinomial regression that was run using mode choice category and trip purpose also included all the age group categories. Table 7 shows the age effects in the multinomial regression. Recalling the three mode choice categories: Inactive-private (car, truck, van, taxi, and motorcycle), active (walk/jog or bicycle), and inactive-public (bus and other modes). The inactive-public mode as well as the 76+ age group are used as the reference categories for this regression.

By reviewing the results of the regression analysis, a few patterns begin to emerge. It is evident that children have different travel patterns than adults. Young children are more likely to travel using inactive-private modes such as the automobile and older children are more likely to choose active modes for travel. This can most likely be attributed to the fact that young children are captive to the mode chosen by their parents or guardians. Older children tend to have more freedom for travel but lack the means (a driver's license) to utilize inactive private modes. As for young adults ages 17 and 18, are more likely to choose active modes and are not likely to choose inactive-private modes for travel. This could be because individuals in this age group tend to be students, and they cannot generally afford a personal automobile (parking is particularly taxing in terms of cost and availability in the core of Centre County and the Penn State campus for specific population groups such as the university students). Adults from ages 19 to 45 are highly likely to choose active modes and are not likely to choose inactive-private modes such as an automobile. Older adults of ages 46 to 75 are more likely to choose both

inactive-private and active modes over inactive-public and are most likely to choose active modes. Notable, however, is the lack of significance of the regression coefficients for the 66 to 75 age group showing the 1017 trips of the 128 persons in that category do not indicate a clear mode preference. This may be due again to the captive nature of this group that may depend on others for their traveling. The 76+ group is too small to offer us any reliable indications.

(Insert Table 7 Here)

After determining that age and purpose both have significant effects on mode choice, a threshold test was performed to determine what kind of an effect distance has on mode choice. Previous research has shown that active modes decrease with distance, but they do not say at what distance this happens (35). To determine to what distances active travelers are willing to travel, we utilized the previously created active subsets of walking and biking trips. By performing an ascending sort on the mode distance for all trips taken utilizing those modes, we were able to determine a minimum and maximum for each active mode. Table 7 displays the descriptive data for each individual active mode as well as active travel as a whole.

(Insert Table 8 Here)

Plotting the distance covered by each active trip in a histogram and applying a normal distribution curve allows us to determine at what distance the majority of active trips for each mode would be contained. Table 8 shows distance statistics for active modes. By adding one standard deviation to the mean, a threshold was developed for each mode. This is the distance at which the majority of active trips by a particular mode are contained. For the walk/jog mode, the threshold of travel occurred at 1.43 miles (2.30 km) and for the bicycle mode the threshold of travel occurred at 5.78 miles (9.31 km). These thresholds show the distance that the majority of travelers will not pass. A small number of individual travelers may travel beyond this threshold, but the majority of trips will occur within this boundary. From the data used here, we can assume that travelers for distances beyond 6 miles (9.66 km) will choose a mode other than walk/jog or bicycle to reach their destination. This establishes that active modes of transportation will only be utilized for trips that are within a 6 mile (9.66 km) radius of their starting location.

The initial analyses shown above establish that trip purpose, age and distance all play important roles in determining which travel mode will be selected to reach a destination. In order to establish a complete profile for active and inactive travelers alike a different analysis is applied at the level of the individual person.

Using a database with summary statistics for each survey participant, a latent cluster analysis was performed using frequencies of trips for each mode as clustering variables, along with many socio-demographic covariates such as age, gender, marital status, driver's license, household size, number of vehicles per household, and annual household income as the explanatory variables. This can be accomplished using a newly developed algorithm and software with many advantages over the more traditionally used methods (48). By running these variables in a latent cluster analysis we were able to assign groups of individuals into clusters with others who share similar travel behaviors while accounting for differences due to demographic characteristics. The analysis began with a one-cluster model and the number of clusters was increased each time the model was run. Based on a nine-cluster model a number of

combinations of covariates were tested. The covariates used in this final model are age group, having a driver's license, whether or not employed, number of children by age, etc. By analyzing the cluster travel behaviors and determining which clusters utilize active modes versus inactive modes, we can produce a description of demographic characteristics corresponding to specific mode choice tendencies. This will allow accurate predictions of mode choice for individuals meeting the demographic criteria for each of the clusters. The latent cluster analysis established nine homogenous clusters of travelers within our sample. Each traveler was assigned to only one cluster based on the demographic and travel behavior data collected through the travel diaries they completed. Table 9 provides the detailed profiles for the nine clusters.

(Insert Table 9 Here)

The nine distinct groups that emerged from the latent cluster analysis prove to have unique characteristics. The first and largest group contains almost 44% of the sample and made by typical car users. A second large group contains persons using their car the most often (70%) but walking a lot more than the first group (24% of their trips). The third group contains almost 14% of the sample and contains the persons that use their car and walk with equal relative frequency. These three groups contain persons that have similar average age and male/female composition (except for the third group that contains slightly more women). The rest of the groups are of very different composition. For example, cluster 4 is primarily made up of young people (mean age 14.82) coming from families with medium high to lower incomes (57% of households earn less than $70,000 per year). These individuals use the bus and automobile as primary forms of transportation. In cluster 5 almost all trips (98%) are taken using the automobile as the mode of travel. These individuals tend to be older (mean age 46.67) and have lower rates of amenities such as cable TV (67%) and internet access (74.2%). Cluster 9 stands out as the most active cluster utilizing Bicycles (43.3%) and walking (30%) as their primary modes of transportation which is notable considering that 100% of its members have a current driver's license. These individuals tend to be younger (mean age 33.07) and have very high levels of education (16.3% Masters Degree, 32.6% Doctorate Degree). They all subscribe to Cable Television and all have access to the Internet. This group is composed mostly of males (93%) that have no children (58% households have less than 2 people). It is most interesting to note that the clusters containing a majority of middle-class/middle aged travelers are the least active. These clusters utilize the automobile almost as their sole form of transportation for over 90% of all trips and they account for over half (51%) the individuals in the sample. This basic blueprint of demographic characteristics for active and inactive travelers and the evidence from the trip purpose analysis demonstrates that mode choice for individuals and particularly the choice of physically active modes is emerging from a wide variety of heterogeneous behavior. As a result policy actions that may work well for the physically active groups today may not work at all for the inactive groups because they are persons from different lifestyles and completely different situations and daily schedules. This is a clear evidence that policy definition will require tailoring and more studies at the micro (individual) and household levels examining time and task allocation within households. This is an area of inquiry that is missed by recent research programs (one example is the Robert Wood Johnson foundation's commissioned studies) that focus on ways to change the urban environment with the hope that travelers will abandon their cars.

CONCLUSIONS

The current design of American cities and the increase of urban sprawl producedfewer non-motorized options for today's travelers. However, this alone is not the cause of a car-dominated travel behavior. By looking more carefully into the factors that affect active travel and the use of bikes and walking, we gain a greater understanding of why people choose the modes for a variety of trips and the heterogeneity in these factors.

As expected, it is found that the trip's purpose is an important factor when people choose their travel mode. Active modes such as walking and bicycling serve distinctly different purposes than other motorized forms of transportation. A bicycle is most likely to be used for school related travel, while individuals are most likely to use walking as either a mode to work or more often for recreation. Walking is also a mode often chosen for all other purposes but second to the automobile. The majority of trips for all purposes are taken using automotive transportation. This does not come as a surprise considering that when initially analyzing this study sample, it was determined that 89% of the individuals had sedentary or inactive lifestyles.

Age comes into play as a defining factor for which modes individuals will utilize. Age plays an important role in mode choice both active and inactive even in the presence of other demographic variables. The mean age for active travelers was 3 years younger than the general sample while the mode age for active travelers was 29 years younger than the general sample. Distance has also shown to be a major deterrent for active travel. It is doubtful that any trip over 6 miles (9.66 km) will be taken using an active mode. When confined solely to walking or jogging as mode choices the distance decreases to a meager 1.43 miles (2.3 km). While these seem to be small distances, the mean distance for biking is only 2 miles (3.22 km) and 0.59 miles (0.95 km) for walking or jogging. With current development and suburbanization in the United States sprawling destinations further apart, it is likely that very few trips will be located within this small distance threshold for active travel. This is a possible explanation for the wide spread use of active modes as recreation rather than destination modes, and the high frequencies of automobile travel.

The latent cluster analysis was able to provide a clear picture of what different kinds of travelers look like both as active and inactive. The wealthiest travelers are the most likely to mix automobile and active modes of transportation, while the poorest are more likely to split their travel between the bus and walking. It is the middle class/middle aged clusters that are utilizing their automobiles as their sole form of transportation. These auto-dependent clusters (cluster 1 and 5) account for nearly 51% of the research sample. Identifying a set of homogenous groups of people based on the their travel behavior and establishing a blueprint for each cluster along with socio-demographic characteristics allow us to not only gain a greater understanding of their travel behaviors but also predict which modes individuals are most likely to choose in a given situation based on their cluster type and trip purpose. This information can be highly beneficial for planners and other transportation specialists who can now target specific groups with new transportation plans and infrastructure.

This analysis does have many recognized limitations. For example, we have not examined the scheduling interactions within households and their effect on active mode frequency of use, or the influence of home to work distance and in general the influence of accessibility from the home location and work location. These are left as future research tasks. Also not accounted for in this research is the impact that community design plays on active mode choice. This research served as a pilot study for additional research that is currently under way,

which will further identify the roles that community design and access to active infrastructure have on active mode choice.

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LIST OF TABLES AND FIGURES

TABLE 1 Sample Characteristics

Characteristics		CentreSIM Sample
Number of persons in the sample		1471
Number of households in the sample		712
Percent of males in the sample		48.2*
Persons per household		2.75
Children 1 to 4 years old per household		0.17
Children 5 to 12 years old per household		0.31
Children 13 to 15 years old per household		0.13
Children 16 to 18 years old per household		0.12
Cars per household		2.18
Number of employed (>=40 hours per week) persons in the sample		575 (39.8%)
Number of employed (<40 hours per week) persons in the sample		129 (8.9%)
College/University Students		148 (10.2%)
Total Combined Annual Household Income	<=$40,000	31.0%
	$40,001 to $70,000	32.5%
	=>$70,001	36.5%
Number of trips per day	Day 1	4.5
	Day 2	4.4
Number of activities (excluding trips) per day	Day 1	11.8
	Day 2	11.6
Number of in-home activities per day	Day 1	9.0
	Day 2	8.9
Total amount of time at home (min) per day	Day 1	983
	Day 2	1003
Total amount of time traveling (min.) per day	Day 1	92.5
	Day 2	85.0

* 1.4% missing

TABLE 2 Characteristics of Active and Inactive Travelers

Characteristic	Active Travelers	Inactive Travelers
Number of Persons	527	944
Mean Travel Time per day (in minutes)	10.28	162.62
Age		
Mean	38.78	41.83
Median	39	44
Mode	22	51
Gender		
Male	46.90%	48.60%
Female	52.40%	50.10%
No Answer	0.70%	1.30%
Highest Level of Education Completed		
High School Diploma or less	38.70%	47.80%
Associate or Bachelors Degree	29.60%	29.30%
Professional or Masters Degree	18.40%	14.10%
Doctoral Degree	12.20%	7.10%
No Answer	1.10%	1.70%
Martial Status		
Now Married	51.40%	58.80%
Divorced	5.50%	5.20%
Separated	0.20%	0.30%
Widowed	2.70%	3.40%
Never Married	36.40%	28.50%
No Answer	3.80%	3.80%
Household Size* (number of persons)		
1	14.40%	10.70%
2	36.60%	40.80%
3	19.50%	20.20%
4	18.60%	18.90%
5	10.80%	9.30%
Annual Household Income* (in U.S. dollars)		
$10,000 or less	5.10%	2.40%
$10,001-$20,000	8.90%	5.90%
$20,001-$30,000	7.40%	8.10%
$30,001-$40,000	10.20%	12.80%
$40,001-$50,000	8.90%	9.40%
$50,001-$60,000	10.40%	12.60%
$60,001-$70,000	8.00%	9.10%
$70,001-$80,000	11.40%	9.10%
$80,001-$90,000	8.00%	7.70%
$90,001-$100,000	5.30%	5.0%
Over $100,000	11.80%	13.80%
No Answer	4.60%	4.10%
Possesses a valid Drivers License	86.70%	80.90%
Subscribes to Cable Television	85.80%	81.60%
Subscribes to Satellite Television	6.00%	11.20%
Has Access to the Internet	89.40%	83.20%
Number of Vehicles in the Household		
0	4.00%	1.30%
1	29.80%	22.70%
2	41.20%	45.50%
3	18.00%	19.10%
4	5.50%	8.50%

5+	0.80%	2.40%
No Answer	0.70%	0.50%

***** *Weighted frequency by number of persons*

TABLE 3 Percent of Trips within Mode (Top two destinations highlighted)

	Automobile	Bus	Taxi	Motorcycle	Bicycle	Walk/Jog	Other	Total
To Work	1131 10.80%	22 4.60%	4 28.6%	0 0.00%	15 14.40%	312 15.20%	1 2.80%	1485
To School	174 1.70%	160 33.10%	0 0.00%	0 0.00%	20 19.20%	224 10.90%	1 2.80%	579
Other Work	218 2.10%	14 2.90%	0 0.00%	0 0.00%	1 1.00%	51 2.50%	4 11.10%	288
Other School	1 0.00%	1 0.00%	0 0.20%	0 0.00%	0 0.00%	1 0.00%	0 0.00%	3
From Work	674 6.50%	20 4.10%	3 21.40%	0 0.00%	10 9.60%	75 3.70%	0 0.00%	782
From School	138 1.30%	94 19.50%	0 0.00%	0 0.00%	9 8.70%	100 4.90%	0 0.00%	341
Return Home	2896 27.80%	28 5.80%	4 28.60%	1 33.33%	18 17.30%	223 10.90%	1 2.80%	3171
Shopping	1358 13.00%	7 1.40%	0 0.00%	0 0.00%	0 0.00%	67 3.30%	0 0.00%	1432
Dining	518 5.00%	2 0.40%	2 14.30%	1 33.33%	4 3.80%	121 5.90%	0 0.00%	648
Refreshment	33 0.30%	3 0.60%	0 0.00%	0 0.00%	0 0.00%	16 0.80%	0 0.00%	52
Medical	90 0.90%	1 0.20%	0 0.00%	0 0.00%	0 0.00%	5 0.20%	1 2.80%	97
Appointment	115 1.10%	3 0.60%	0 0.00%	0 0.00%	1 1.00%	16 0.80%	0 0.00%	135
Escort	760 7.30%	2 0.40%	0 0.00%	0 0.00%	1 1.00%	21 1.00%	0 0.00%	784
Delivery	26 0.20%	0 0.00%	0 0.00%	0 0.00%	1 1.00%	4 0.20%	0 0.00%	31
Errands	365 3.50%	1 0.20%	0 0.00%	0 0.00%	2 1.90%	36 1.80%	0 0.00%	404
Recreation	1319 12.60%	20 4.10%	1 7.10%	1 33.33%	18 17.30%	504 24.60%	12 33.30%	1875
Visiting	433 4.10%	2 0.40%	0 0.00%	0 0.00%	2 1.90%	45 2.20%	0 0.00%	482
To Other Mode	185 1.80%	103 21.30%	0 0.00%	0 0.00%	2 1.90%	225 11.00%	16 44.40%	531
Total Trips	10434 100.00%	483 100.00%	14 100.00%	3 100.00%	104 100.00%	2046 100.00%	36 100.00%	13120

TABLE 4 Percent of Trips within Purpose (Top two modes highlighted)

	Auto.	Bus	Taxi	Motor-cycle	Bicycle	Walk/ Jog	Other	Total Trips
To Work	1131 76.20%	22 1.50%	4 0.30%	0 0.00%	15 1.00%	312 21.00%	1 0.10%	1485 100.00%
To School	174 30.10%	160 27.60%	0 0.00%	0 0.00%	20 3.50%	224 38.70%	1 0.20%	579 100.00%
Other Work	218 75.70%	14 4.90%	0 0.00%	0 0.00%	1 0.30%	51 17.70%	4 1.40%	288 100.00%
Other School	1 33.33%	1 33.33%	0 0.00%	0 0.00%	0 00.0%	1 33.33%	0 0.00%	3 100.00%
From Work	674 86.20%	20 2.60%	3 0.40%	0 0.00%	10 1.30%	75 9.60%	0 0.00%	782 100.00%
From School	138 40.50%	94 27.60%	0 0.00%	0 0.00%	9 2.60%	100 29.30%	0 0.00%	341 100.00%
Return Home	2896 91.30%	28 0.90%	4 0.10%	1 0.01%	18 0.60%	223 7.00%	1 0.01%	3171 100.00%
Shopping	1358 94.80%	7 0.50%	0 0.00%	0 0.00%	0 0.00%	67 4.70%	0 0.00%	1432 100.00%
Dining	518 79.90%	2 0.30%	2 0.30%	1 0.20%	4 0.60%	121 18.70%	0 0.00%	648 100.00%
Refreshment	33 63.50%	3 5.80%	0 0.00%	0 0.00%	0 0.00%	16 30.80%	0 0.00%	52 100.00%
Medical	90 92.80%	1 1.00%	0 0.00%	0 0.00%	0 0.00%	5 5.20%	1 1.00%	97 100.00%
Appointment	115 85.20%	3 2.20%	0 0.00%	0 0.00%	1 0.70%	16 11.90%	0 0.00%	135 100.00%
Escort	760 96.90%	2 0.30%	0 0.00%	0 0.00%	1 0.10%	21 2.70%	0 0.00%	784 100.00%
Delivery	26 83.90%	0 0.00%	0 0.00%	0 0.00%	1 3.20%	4 12.90%	0 0.00%	31 100.00%
Errands	365 90.30%	1 0.20%	0 0.00%	0 0.00%	2 0.50%	36 8.90%	0 0.00%	404 100.00%
Recreation	1319 70.30%	20 1.10%	1 0.10%	1 0.10%	18 1.00%	504 26.90%	12 0.60%	1875 100.00%
Visiting	433 89.80%	2 0.40%	0 0.00%	0 0.00%	2 0.40%	45 9.30%	0 0.00%	482 100.00%
To Other Mode	185 34.80%	103 19.40%	0 0.00%	0 0.00%	2 0.40%	225 42.40%	16 3.00%	531 100.00%
Total	10434	483	14	3	104	2046	36	13120

TABLE 5 Regression Results for Travel Mode and Trip Purpose

	Active Modes (B Value)	Inactive Modes (B Value)	Number of Trips (%)	Number of Persons (%)
To Work	3.001	1.598	1485 11.32%	660 43.85%
To School	0.292*	0.305*	579 4.41%	267 17.74%
Other Work	2..621	1.174	288 2.20%	141 9.37%
Other School	19.356	18.643	3 0.02%	3 0.20%
Home from Work	2.714	0.389*	782 5.96%	517 34.35%
Home from School	.658	0.329*	341 2.59%	216 14.35%
Return Home	4.164	1.519	3171 24.17%	1298 86.25%
Shopping	4.468	1.234	1432 10.91%	786 52.23%
Dining	4.886	3.232	648 4.94%	477 31.69%
Refreshment	1.968	1.168*	52 0.39%	45 2.99%
Doctor Appointment	3.029	0.300*	97 0.74%	93 6.18%
Other Appointment	2.833	0.785*	135 1.03%	120 7.97%
Escort	5.943	2.241	784 5.98%	344 22.86%
Delivery	20.431	19.150	31 0.24%	31 2.06%
Errands	4.807	2.471	404 3.08%	305 20.27%
Recreation or Leisure	3.394	2.479	1875 14.29%	953 63.32%
Visiting Family or Friends	4.964	2.423	482 3.67%	342 22.72%
To Other Mode**	-	-	531 4.06%	189 12.56%
Total	-	-	13120 100.00%	1505 100.00%

* Not significant at the 0.05 level

** To other mode purpose and inactive-public mode choice used as reference categories in this regression

TABLE 6 Active Travelers Ages

	Bike	Walk/Jog	All Active
Mean	34.9	38.93	38.63
Median	29	39	38.5
Mode	22	22	22
Std. Dev	19.25	19.09	19.02
Min	3	1	1
Max	77	90	90
	Distribution of Active Travelers by Age		
0-10	22.20%	6.70%	6.90 %
11-20	0.00%	12.50%	12.10%
21-30	33.40%	18.50%	19.50%
31-40	22.20%	14.10%	14.30%
41-50	0.00%	17.50%	17.20%
51-60	0.00%	15.30%	15.00%
61+	22.20%	15.40%	15.00%
Total	100%	100%	100%

TABLE 7 Regression Results for Mode Choice and Age Group

Age Group	Inactive-Private Modes (B Value)	Active Modes (B Value)	Number of Trips (%)	Number of Persons (%)
Young Children 0 to 10	-0.835*	-0.866*	905 6.89%	134 8.90%
Older Children 11 to 16	-1.548	-0.940*	605 4.61%	84 5.60%
17 to18	-0.105*	0.215*	171 1.30%	19 1.30%
19 to 25	-0.901	1.432	1349 10.28%	129 8.60%
26 to 45	-0.061*	1.064	3706 28.25%	388 25.80%
46 to 65	1.270	2.007	4336 33.05%	486 32.30%
66 to 75	0.792*	1.007*	1017 7.75%	128 8.50%
76+**	-	-	477 3.64%	75 5.00%
Missing	-	-	554 4.23%	62 4.00%
Total	-	-	13120 100.00%	1505 100.00%

* Not significant at the 0.05 level

** Reference categories for this regression are the 76+ age group and the Inactive-Public mode choice (bus and other)

TABLE 8 Distance Statistics for Active Modes

		Miles[1]
Walk/Jog	Mean	0.59
	Median	0.30
	Mode	0.10
	Minimum	0.01
	Maximum	10.00
	Std. Dev.	0.83
Bicycle	Mean	2.01
	Median	0.75
	Mode	0.50
	Minimum	0.10
	Maximum	25.00
	Std. Dev	3.78
All Active	Mean	0.66
	Median	0.30
	Mode	0.10
	Minimum	0.01
	Maximum	25.00
	Std. Dev.	1.19

[1] 1 mi = 1.61 km

TABLE 9 Latent Cluster Analysis Result Descriptions

Cluster #	1	2	3	4	5	6	7	8	9
# of People	658 43.75%	221 14.69%	210 13.96%	106 7.05%	113 7.51%	94 6.25%	45 2.99%	45 2.99%	13 0.86%
Travel Mode Most Used Car, Bus, Walk, Bike	92.00%-Car	70.00%-Car 24.00%-Walk	48.00%-Car 48.00%-Walk	40.00%-Car 41.00%-Bus	98.00%-Car	48.00%-Car 47.00%-Walk	37.00%-Car 36.90%-Walk 21.30%-Bus	54.90%-Car 24.10%-Bus	43.30%-Bike 30.00%-Walk
Mean Age	44.75	48.09	43.38	14.82	46.67	43.2	30.11	26.60	33.07
Gender (%)	M-50.30 F-48.10	M-49.70 F-50.30	M-42.90 F-56.20	M-52.80 F-45.30	M-44.90 F-55.10	M-39.90 F-60.10	M-56.80 F-43.20	M-52.30 F-47.70	M-93.00 F-7.00
Education (%)	BD[1]-21.50 MD[2]-10.70	BD-24.10 MD-17.00	BD-25.60 MD-14.60	LH[3]-39.60 HS[4]-5.50	HS-38.50 BD-14.30	BD-28.90 MD-21.00	BD-26.00 MD-18.30	BD-33.60 MD-25.60	MD-16.30 DD[5]-32.60
Marital Status (%)	M[6]-67.00 NM[7]-21.90	M-81.00 NM-10.00	M-58.00 NM-29.00	NM-91.70	M-56.90 NM-29.90	M-60.00 NM-28.00	M-28.80 NM-58.20	M-24.80 NM-70.40	M-41.90 NM-58.10
Drivers License (%)	88.00	96.80	86.60	15.50	80.10	100.00	100.00	89.70	100.00
Cable TV (%)	81.50	87.70	82.90	80.70	67.90	82.50	90.30	92.80	100.00
Satellite TV (%)	13.70	10.00	7.20	12.60	17.90	6.20	0.00	1.60	0.00
Internet Access (%)	79.80	90.60	80.70	93.90	74.20	92.80	95.80	93.60	100.00
HH[8] Size	46.00% = 2	36.00% = 2	47.00% = 2	72.90% = 4-5	46.80% = 2	78.60% = ≤3	76.90% = ≤3	74.20% = ≤3	58.00% = ≤2
Annual HH Income (Thousands)	57.80%= 30-80 14.50% = 100+	50.70% = 30-80 19.30% = 100+	62.90% = 30-80 11.70% = 100+	57.00% = <70 15.00% =100+	56.20% = 30-80 12.40% =100+	55.30% =>60 14.80% =100+	70.30% =<70 1.80% =100+	82.60% = <40 6.60% =100+	73.00% =<70 21.60% =100+

[1] BD = Bachelors Degree
[2] MD = Masters Degree
[3] LH = Less than High School
[4] HS = High School
[5] DD = Doctoral Degree
[6] M = Now Married
[7] NM = Never Married
[8] HH = Household